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FORM PTO-1390
(REV. 11-2000)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER

2609-1-001

U.S. APPLICATION NO. (If known, see 37 CFR 1.5

09/890489

INTERNATIONAL APPLICATION NO.
PCT/ES00/00033INTERNATIONAL FILING DATE
February 3, 2000PRIORITY DATE CLAIMED
February 3, 1999

TITLE OF INVENTION

PURIFICATION EQUIPMENT FOR WASTEWATER COMING FROM FRUIT AND VEGETABLE ...APPLICANT(S) FOR DO/EO/US
Manuel GARCIA PORTILLO; et al.

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.
4. The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. is attached hereto (required only if not communicated by the International Bureau).
 - b. has been communicated by the International Bureau.
 - c. is not required, as the application was filed in the United States Receiving Office (RO/US).
6. An English language translation of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. is attached hereto.
 - b. has been previously submitted under 35 U.S.C. 154(d)(4).
7. Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
 - a. are attached hereto (required only if not communicated by the International Bureau).
 - b. have been communicated by the International Bureau.
 - c. have not been made; however, the time limit for making such amendments has NOT expired.
 - d. have not been made and will not be made.
8. An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)). Executed
10. An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 20 below concern document(s) or information included:

11. An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. A FIRST preliminary amendment.
14. A SECOND or SUBSEQUENT preliminary amendment.
15. A substitute specification.
16. A change of power of attorney and/or address letter.
17. A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
18. A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. Other items or information:

Four (4) sheets of formal drawings (Figs. 1-4); First page of published application; Copy of International Search Report; Written Opinion and Response.

page 1 of 2

EXPRESS MAIL "MAILING CERTIFICATE NO.": EL 920249940 US

DATE OF DEPOSIT: July 31, 2001

U.S. APPLICATION NO. (if known, see 37 CFR 1.6)

09/890489

INTERNATIONAL APPLICATION NO.

PCT/ES00/00033

ATTORNEY'S DOCKET NUMBER

26091-001

21. The following fees are submitted:**BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)):**

Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO \$1000.00

International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$860.00

International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$710.00

International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$690.00

International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) \$100.00

ENTER APPROPRIATE BASIC FEE AMOUNT =**CALCULATIONS PTO USE ONLY**

Surcharge of \$130.00 for furnishing the oath or declaration later than 20 30 months from the earliest claimed priority date (37 CFR 1.492(e)).

\$ 1000.00

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	\$
Total claims	6 - 20 =	0	x \$18.00	\$
Independent claims	1 - 3 =	0	x \$80.00	\$
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$270.00	\$

TOTAL OF ABOVE CALCULATIONS = \$ 1000.00

Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.

\$ 500.00

SUBTOTAL = \$ 500.00

Processing fee of \$130.00 for furnishing the English translation later than 20 30 months from the earliest claimed priority date (37 CFR 1.492(f)).

\$

TOTAL NATIONAL FEE = \$ 500.00

Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +

\$ 40.00

TOTAL FEES ENCLOSED = \$ 540.00**Amount to be refunded:** \$**charged:** \$

- a. A check in the amount of \$ 540.00 to cover the above fees is enclosed.
- b. Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.
- c. The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 11-1153. A duplicate copy of this sheet is enclosed.
- d. Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137 (a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO

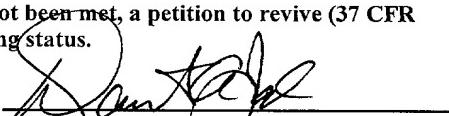
DAVID A. JACKSON

KLAUBER & JACKSON

411 Hackensack Avenue, 4th Floor

Hackensack, New Jersey 07601

(201) 487-5800



SIGNATURE

DAVID A. JACKSON

NAME

26,742

REGISTRATION NUMBER

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANTS : Manuel GARCIA PORTILLO *et al*
APPLICATION NO. : PCT/00/00033
FILED : 3 February 2000
FOR : PURIFICATION EQUIPMENT FOR WASTEWATER COMING
FROM FRUIT AND VEGETABLE PROCESSING PLANTS
AND PHYTOSANITARY TREATMENTS IN THE FIELD

PRELIMINARY AMENDMENT

ASSISTANT COMMISSIONER FOR PATENTS
BOX PCT
WASHINGTON, D.C. 20231

Sir:

Prior to calculating the fees pursuant to the entry into the National Phase of the above-identified Application, please amend the Claims as follows:

IN THE CLAIMS:

Please amend Claims 2-6 attached, which correspond to the claims as amended during the pendency of the International Application.

2. (Amended) A purification system according to claim 1, characterized in that the tank-filter (1) is a settling tank with at least two outlets for the clarified water, to which flocculent can be added, the sludge being extracted by gravity through the lower part thereof and sent to a filtering bag (5) where it is retained, while the clarified water is sent to an intermediate tank (7), being joined to this the water which passes through said filtering bag (5) and is received in a collection tank (6).

3. (Amended) A purification system according to claim 2, characterized in that the filtering bag (5) is arranged inside a metal frame (4) which acts as a support for it and as a collector for the water passing through it on its way to the reception tank (6).

4. (Amended) A purification system according to claim 1, characterized in that the tank-filter (15) is a polypropylene bag filter that includes diatomaceous earth, with circulation being maintained in closed circuit from the tank (6) containing water, the bags being filled with a pre-layer of this earth; a pump (11a) sucking the liquid to be purified and which passes through that filter (15) to the reception tank (6), from where it is decanted to the array of columns 9 of activated carbon.

5. (Amended) A purification characterized according to claims 1, characterized in that at the outlet from the array of columns 9 of activated carbon is included an ultraviolet lamp (13) for optimizing the purification.

6. (Amended) A purification system for wastewater coming from fruit and vegetable processing plants and phytosanitary treatments in the field, according to claim 1, characterized in that the array of columns 9 of activated carbon, three in number, are mounted on a rotating plate (17) where there exists a fourth bottle (9) in reserve, which replaces number three when the first one becomes clogged up and is withdrawn and replaced by the second, with the third taking over in the second place.

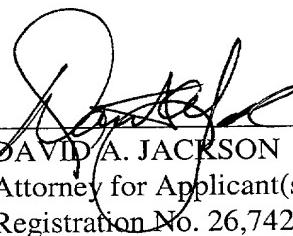
REMARKS

The above amendments are submitted herewith to reduce multiple dependencies and to conform the claims more closely to U.S. practice.

The amendments made herein are with respect to Claims 2-6, which claims were amended during the pendency of the International Application. A copy of the complete text including all amendments made during the International Phase is attached hereto. Applicant requests that these claims be considered as a record presently and therefore correspond to the claims as originally presented in the processing of the present application in the National Phase before the U.S. Patent and Trademark Office.

In view of the above and foregoing, early examination and favorable consideration of the present Application as amended is believed to be in order and is courteously solicited.

Respectfully submitted,



DAVID A. JACKSON
Attorney for Applicant(s)
Registration No. 26,742

KLAUBER & JACKSON
411 Hackensack Avenue
Hackensack, NJ 07601
(201) 487-5800

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In The Claims:

Claims 2, 3, 4, 5, and 6 have been amended as follows:

2. (Amended) A purification [equipment] system according to claim 1, characteri[s]zed in that the tank-filter (1) is a settling tank with at least two outlets for the clarified water, to which flocculent can be added, the sludge being extracted by gravity through the lower part thereof and sent to a filtering bag (5) where it is retained, while the clarified water is sent to an intermediate tank (7), being joined to this the water which passes through said filtering bag (5) and is received in a collection tank (6).

3. (Amended) A purification [equipment] system according to claim 2, characteri[s]zed in that the filtering bag (5) is arranged inside a metal frame (4) which acts as a support for it and as a collector for the water passing through it on its way to the reception tank (6).

4. (Amended) A purification [equipment] system according to claim 1, characteri[s]zed in that the tank-filter (15) is a polypropylene bag filter that includes diatomaceous earth, with circulation being maintained in closed circuit from the tank (6) containing water, the bags being filled with a pre-layer of this earth; a pump (11a) sucking the liquid to be purified and which passes through that filter (15) to the reception tank (6), from where it is decanted to the array of columns 9 of activated carbon.

5. (Amended) A purification [equipment] characteri[s]zed according to [any of the preceding] claim[s] 1, characteri[s]zed in that at the outlet from the array of columns 9 of activated carbon is included an ultraviolet lamp (13) for optimi[s]zing the purification.

6. (Amended) A purification [equipment] system for wastewater coming from fruit and vegetable processing plants and phytosanitary treatments in the field, according to [any of the above claim[s] 1, characteri[s]zed in that the array of columns 9 of activated carbon, three in number, are mounted on a rotating plate (17) where there exists a fourth bottle (9) in reserve, which replaces number three when the first one becomes clogged up and is withdrawn and replaced by the second, with the third taking over in the second place.

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JC18 Rec'd PCT/PTO 31 JUL 2001

**COMPLETE TEXT INCLUDING ALL THE
AMENDMENTS MADE DURING INTERNATIONAL
PHASE**

00000000000000000000000000000000

J/PRTS

- 1 -

J203 Rec'd PCT/PTO 31 JUL 2001

**PURIFICATION EQUIPMENT FOR WASTEWATER COMING FROM
FRUIT AND VEGETABLE PROCESSING PLANTS AND PHYTOSANITARY
TREATMENTS IN THE FIELD**

OBJECT OF THE INVENTION

5 This invention, as stated in the heading to this descriptive report, concerns purification equipment for wastewater coming from fruit and vegetable processing plants and phytosanitary treatment in the field, with which notable relevant and advantageous characteristics
 10 are contributed compared to present conventional purification equipment.

15 The wastewater from chemical products generated in fruit and vegetable processing plants is purified in the different systems of application that are used: drenchers (pallet dousers), fungicide applicators, wax applicators, treatment lines and treatment pools, etc., along with the purification of waste liquid left over from phytosanitary treatments carried out in the field.

BACKGROUND OF THE INVENTION

20 For purification of water contaminated with pesticides, a treatment sequence is currently followed of: conventional filtration - activated carbon - biological degradation, as considered in the decontamination system of invention patent with publication number ES2050909
 25 referring to the detoxification of solutions that could contain toxic substances such as pesticide residues.

30 The system consists of a tank where the liquid is collected, fitted with a basket made of a grating with a hole size of 0.8 mm. The tank has an air inlet for the introduction of compressed air that is mixed with the liquid, thereby improving the degradation of toxic materials in the liquid.

35 The toxicity level of the water in the tank is established so that, depending on this level, the water is transferred to the appropriate decontamination subsystems.

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With a high level of toxicity, the water is conducted to a retaining tank, fed with a constant source of compressed air.

5 The treated liquid passes through an earth bed reactor. The reactor includes a layer of earth on a series of permeable concrete blocks. The liquid is applied to the upper part of the layer of earth by means of a network of conventional drip irrigation pipes. The earth bed reactor contains microorganisms that utilise the organic materials
10 employed as the pesticide as a source of nutrients.

The liquid is diverted from the earth filter to an activated carbon filter. This filter can include a layer of alumina with potassium permanganate for oxidising toxic materials.

15 The final phase of the decontamination system is a settling basin, i.e., an open permeable pool. This basin does not just eliminate a substantial part of the water by evaporation, it also improves the quality of the water by eliminating traces of pesticides. The basin is stocked
20 with species of animals and plants for the additional degradation of the organic material contained in the water.

If wished, a conventional ozonisation system can be included in the system for the introduction of ozone in
25 the rotation tank.

Another system that is known has the treatment sequence: filtration beds with carbon - degradation with specific microorganisms. This method and system for treatment of water is considered in invention patent with
30 publication number WO 94/29224. It considers a system for the purification of water with a high content of organic components, such as waste from agricultural chemicals, and a low DBO.

A porous material is used as a filtration
35 medium, carbon, on which is placed a substrate of specific

microorganism (from the Pseudomonas group). The water enters into contact with these microorganisms under aerobic conditions.

The system consists of five tanks in series,
5 through which the wastewater is made the flow.

Following a treatment sequence of: activated carbon - filtration, we can mention the utility model number 9301506 referring to a wastewater purifier consisting of a vat or trough provided with a stirrer and
10 a tank that links to it underneath via an intermediate bypass valve. Contaminated liquid reaches the vat from the fruit and vegetable treatment zone by means of a pipe, driven by a pump in such a way that the contaminated liquid contained in the trough along with a quantity of
15 activated carbon is removed by a stirrer.

When the stirrer is stopped, the bypass valve is opened and the contaminated elements adhered to the carbon fall by means of settlement down to the lower tank, from where they are extracted.

20 There also exist other filters and a filtration column for totally cleaning the content of the vat of any impurities. The liquid is made to pass through filters in such a way that, by means of closing certain stopcocks before and after an impulsion pump and opening others, the
25 circulation of the fluid from the fruit and vegetable treatment zone towards the vat is prevented, while on the other hand, the circulation of the fluid coming from the vat via the filter circuit is facilitated.

Patent of invention with publication number
30 0447923A1, referring to a polymer adsorption system, reports an effective filtration medium for oils and greases, liquid hydrocarbon, sterols, organic pesticides and other inert liquid compounds with organic bonds and their mixtures.

35 The filtration medium consists of polyvinyl

acetate, whose particles have a porous structure. The polyvinyl acetate comes in sheet form, in particular constructed in the form of a sandwich containing particles of polyvinyl butyral, and there is also polyvinyl acetate
5 in form of multi-chamber structures.

Using a treatment sequence of: biological treatment with specific strains, mention can be made of invention patent ES2095193 referring to the use of bacterial strains of the Pseudomonas genera PCH3 and GCH1
10 for the bio-restoration of soils and purification of water contaminated with acetamide-based herbicides. This system is characterised by using at least one of the Pseudomonas strains PCH3 and GCH1 for the bio-transformation of water contaminated with herbicides. For this, the necessary
15 nutrients have to be added in order to achieve optimisation of the bio-transformation. The water has to be inoculated for treating in a culture with at least one of the microorganisms mentioned above, which must be immobilised on a solid support of a ceramic, synthetic or
20 organic nature. The immobilised microorganism is added as a bio-catalyst to a bio-reactor, with the conditions being regulated in order to optimise the transformation process of the contaminant compounds.

With a treatment sequence: filtration - ultraviolet, invention patent ES2027366 can be mentioned, which discusses an apparatus for water treatment. The apparatus is designed for the purification of drinking water and contains a system for purifying toxic compounds; it is capable of retaining trace quantities.
25

This apparatus consists of a head with an opening for the entrance of water and another for the outlet, and a set of fitted parts that include filtration means and radiation means.
30

The filtration means can consist of mechanical fibres and/or chemical adsorption material, and is
35

preferably of the activated carbon type with granular transverse section.

5 The internal diameter of the filtration means is somewhat greater than the external diameter of the irradiation means. The irradiation means includes an ultraviolet lamp, with or without ozone.

10 Also using a treatment sequence: (ozone) - ultraviolet - activated carbon, mention can be made of the invention patent WO94/25401, concerning a water purification unit. This system is designed for the purification of drinking water and contains a retaining system for toxic compounds prepared for retaining traces quantities. The water to be purified flows under a powerful source of ultraviolet radiation and then passes 15 through an activated carbon filter fitted on the ultraviolet source. The effluent from the filter is again passed through the ultraviolet radiation source. This source eliminates the microorganisms present and the filter retains particles and other compounds.

20 An ozone generator can be incorporated into the water inlet in order to boost the destruction of microorganisms present and oxidise the undesirable components of the water.

DESCRIPTION OF THE INVENTION

25 In general terms, the purification equipment for wastewater coming from fruit and vegetable processing plants and phytosanitary treatment in the field, constituting the object of the invention, basically includes the following elements:

30 First of all, it has a settling tank, of truncated conical shape and manufactured in polyester reinforced with fibreglass, with an approximate capacity of 500 l. This tank will contain two or more outlets at different heights for the settling, one of which will be 35 arranged so as to start at the conical base and the other

at a higher level, more specifically at 50% of the height of the cylindrical part of that tank. It has a flocculent dosing system and a stirrer for producing a good mix. A filtration system for the sludge is provided at the outlet 5 from the tank, and the sludge then passes to a filtering bag of approximately 820 mm in length and 180 mm in diameter, manufactured in single-filament nylon with a mesh-size of 60 to 75 microns. The product filtered in the bag is then passed to a collection tank of approximately 10 50 l and from here it is pumped to an intermediate tank of dimensions similar to the one for settling.

From the intermediate tank, the filtered product passes to a self-cleaning ring filter, of mesh-size 75 microns, and then through some activated carbon columns, 15 normally one to three in number, of the order of 300 l in volume and containing approximately 100 kg of carbon. They are manufactured in polystyrene with an exterior reinforcement of fibreglass and epoxy resin.

There is a system of warning lights for 20 indicating when the activated carbon has become exhausted, and also the necessary pumps and valves for the facility.

The wastewater is pumped from the tanks containing the drenchers using conventional pumps.

Sometimes, at the outlet from the array of 25 activated carbon columns, an ultraviolet lamp is incorporated in order to guarantee a greater degree of purification.

The system includes a reverse-wash mechanism permitting a greater yield to be obtained from the 30 activated carbon columns.

In order to facilitate an understanding of the invention, and forming an integral part of this descriptive report, a sheet of plans is attached containing a single figure in which, by way of 35 illustration and not to be regarded as restrictive, the

following is represented:

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1.- This is a diagram of the functioning of the purification equipment for wastewater coming from fruit and vegetable processing plants and phytosanitary treatment in the field, in accordance with the invention.

Figure 2.- This is another diagrammatic view, similar to figure 1, incorporating an ultraviolet lamp.

Figure 3.- Samples of an installation for carrying out the purification process, including a pressure filter with filtering bags prepared with a pre-layer of diatomaceous earth.

Figure 4.- This is a perspective view of the rotating support carrying the activated carbon bottles.

15 **DESCRIPTION OF THE PREFERRED EMBODIMENT OF THE INVENTION**

Referring to the numbering system adopted in figure 1, we can see how the purification equipment for wastewater coming from fruit and vegetable processing plants and phytosanitary treatment in the field that the invention proposes includes a settling system for the wastewater coming from the fruit washing drenchers. Its function is to separate the suspended solids that the wastewater contains and is composed of a settling tank 1 where the wastewater arrives and where flocculent can be added by means of the flocculation system 2, with mixing by means of a stirrer 3. Following the decanting, the sludge is extracted via the lower part of the tank and the clarified water is transferred to the intermediate tank 7.

30 The approximate efficiencies in the decanting process using flocculation are:

- Suspended solids: 50%
- DQO: 20%
- Imazalil: 20%
- Thiabendazol: 80%

It also includes a sludge treatment system in which the sludge is extracted by gravity from the bottom of the settling tank and arrives at the filtering bag 5, where it is retained and part of the water contained in 5 the sludge is filtered through it. The filtering bag 5 is arranged in a vertical position inside a metal frame 4 which acts as a securing for it and as a collector for the water passing through it on its way to the reception tank 6. This water is pumped from the tank 6 to an intermediate 10 tank 7, where it is combined with the clarified water. The drying of the sludge achieved by means of the filtering bag system is around 50%.

The clarified water and the water from the filtering bag, collected in the intermediate tank 7, are 15 pumped via the ring filter 8. This filter acts as a safety filter for the columns of activated carbon, retaining any remaining solids left in the water.

The equipment also includes the columns of activated carbon, three of them in the examples shown in 20 the diagram. After passing through the safety filter 8, the clarified water arrives at the columns of activated carbon 9, where it is purified by adsorption, with toxic substances being removed down to the threshold values determined by legislation. The warning indicator light 10 indicates when the first column of activated carbon 9 has 25 become exhausted and needs replacing.

The reference 11 refers to the necessary pumps and valves.

The approximate efficiencies in the columns of 30 carbon are:

- Suspended solids: 90%
- DQO: 85%
- Imazalil: 100%
- Thiabendazol: 100%

35 The ecotoxicity values of the purified water are

below 2 U.T.

In the diagram, the settling system for the final fall from the drenchers is referenced with A, and is accessed by the loading mouth of the settling tank 1, as shown by the arrow. In the diagram of figure 1, the block of columns of activated carbon 9 is referenced with B. The block referenced with C corresponds to the sludge treatment system.

The arrows appearing in the diagram indicate the route followed through the installation by the product being purified. The treated water is obtained at the outlet from the block B of columns of activated carbon 9.

Figure 2 is a diagram of an installation that includes an ultraviolet lamp 13, which guarantees a greater degree of purification, the product being collected in tank 12, from where it exits towards the drain.

A description is now going to be given of the installation in which the purification process has been carried out, with special reference to figure 3, where another manner of carrying out the invention is considered.

The dimensioning of the components of the equipment has been determined for a volume of trencher liquid to be purified of 460 l/h, since the equipment has to be dimensioned for different flows and loads of contaminants.

In order to commence the purification process, about 40 l of water are introduced into tank 6 (which has a capacity of around 500 l; the introduction can be done automatically or manually) and it is connected to the stirrer 3 and the pump 11a in closed circuit via the bag filter 15 and the stopcock 14a. After that, some diatomaceous earth is then added little by little and the circulation is kept up for at least 5 minutes.

Once the circulation time has ended, the filtering bags 5 of this pressure filter 15 are prepared with a preload of diatomaceous earth. At that moment the electrovalve 14a is closed and number 14b is opened, which causes the pumps 11a to suck the liquid to be purified and introduce it into the tank 6 with the solids being filtered down to a particle size of less than 50 microns.

In this pressure filter 15, a pretreatment or conditioning stage of the discharge takes place. In a second stage, the final treatment or reduction of the contaminant load is produced.

In this first pretreatment stage, what is sought is to reduce the load of solids present in the water coming from the drencher, and to proceed to an initial reduction of the contaminating load. For this purpose, a polypropylene bag filter (of no more than 50 microns) is provided for retaining all solids larger than this pore size. To help the filtration system diatomaceous earth is included, forming a pre-layer on the inside of the polypropylene bags, taking advantage of the selective permeability of this earth and the power it has to adsorb oils.

The objective is multiple:

- To help in the filtering, improving it by preventing rapid clogging.

- To retain the small percentage of oil from the preparations.

- To protect the walls of the bag and thereby extend their life.

The final result of the combination of ball / diatomaceous earth is:

- Very high reduction of sedimentable solids.
- High reduction of suspended solids.
- Reduction of the pesticide load.
- Reduction of oils present.

In the case of proceeding to the purification of water from processing lines, these would first be stored in a retaining tank 16 of a suitable size so that the water can be purified at the necessary speed.

Once the liquids have been filtered in the tank 6, the pump 11b is started up, driving the liquids through three bottles 9 of activated carbon making up the array of columns 9, with each of them having a volume of the order of 316 l. A minimum permanency of two hours for the liquid inside the bottles 9 of activated carbon must be guaranteed. For this, there is a litre counter with an electronic output connected to an electrical automatism that prevents the pump from continuing to drive the liquid until the liquid that is inside the bottles 9 has remained there for at last two hours. Moreover, this volumetric counter will also be in charge of warning that the activated carbon in the first bottle 9 is becoming exhausted and needs to be replaced. A telephone warning device can be connected so that the supplier company can proceed to carry out the change. The equipment has been designed so that a fourth bottle of activated carbon can be incorporated, as shown in figure 4. In this way, the third bottle would easily be able to be replaced by the spare one, with this third bottle taking over the position of the second one, which would in turn occupy the first position once the clogged up bottle had been removed. These four bottles 9 are located on a rotating plate 17, this entire process of permutation being carried out by means of a simple motorised or manual rotation through 90° , as can be easily deduced from observing the figure.

Control over the equipment is done by means of a programmable automaton connected to a touch-sensitive screen enabling the user to programme all the operational parameters of the equipment, with the records of flows and consumptions, warnings of replacements, etc., and

permitting connection to a personal computer for greater versatility in its handling. This computer can in turn be connected to another remote terminal by modem, permitting remote control.

5 The first filtering bottle 9 incorporates a reverse-wash valve 18 permitting this process to be carried out in the event of the activated carbon in the first bottle 9 becoming compacted, since this bottle is the one that suffers the greatest contaminant load. This
10 process can be carried out automatically once the differential pressure between the inlet and the outlet exceeds a defined value. The water from the reverse-washing is returned to the tank 6 for being treated as if it were an ordinary part of the liquid for purifying.

15 Once the liquid exits from the bottles 9 of activated carbon, it could optionally be treated by means of ultraviolet lamps 13 and/or an ozoniser 19, before being discharged.

20 The reference 20 in figure 3 refers to a flow meter.

CLAIMS

1. A purification system for wastewater from fruit- and vegetable-processing plants and from phytosanitary treatments, the system comprising

5 a filter tank (1,15) where a pretreatment step is carried out;

a tank (6,7) for collecting clarified water resulting from the pretreatment step, said tank (6,7) comprising a stirrer (3) for uniformly mixing the
10 clarified water;

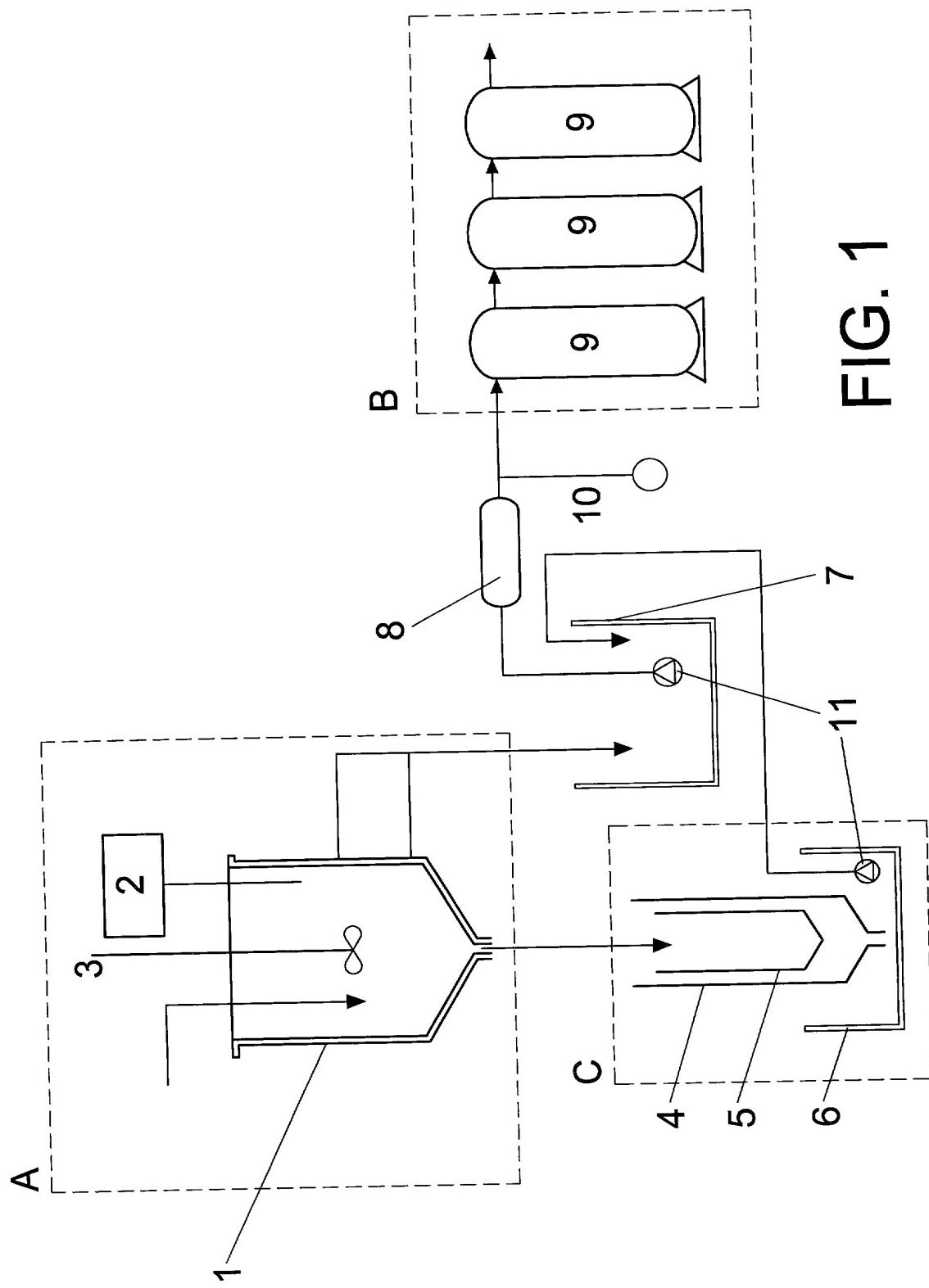
pumping means (11) for pumping mixed clarified water from said tank (6,7) to a first active carbon column (9) of an array of active carbon columns (9) being prepared for purifying the mixed clarified water by adsorption up
15 to established threshold values;

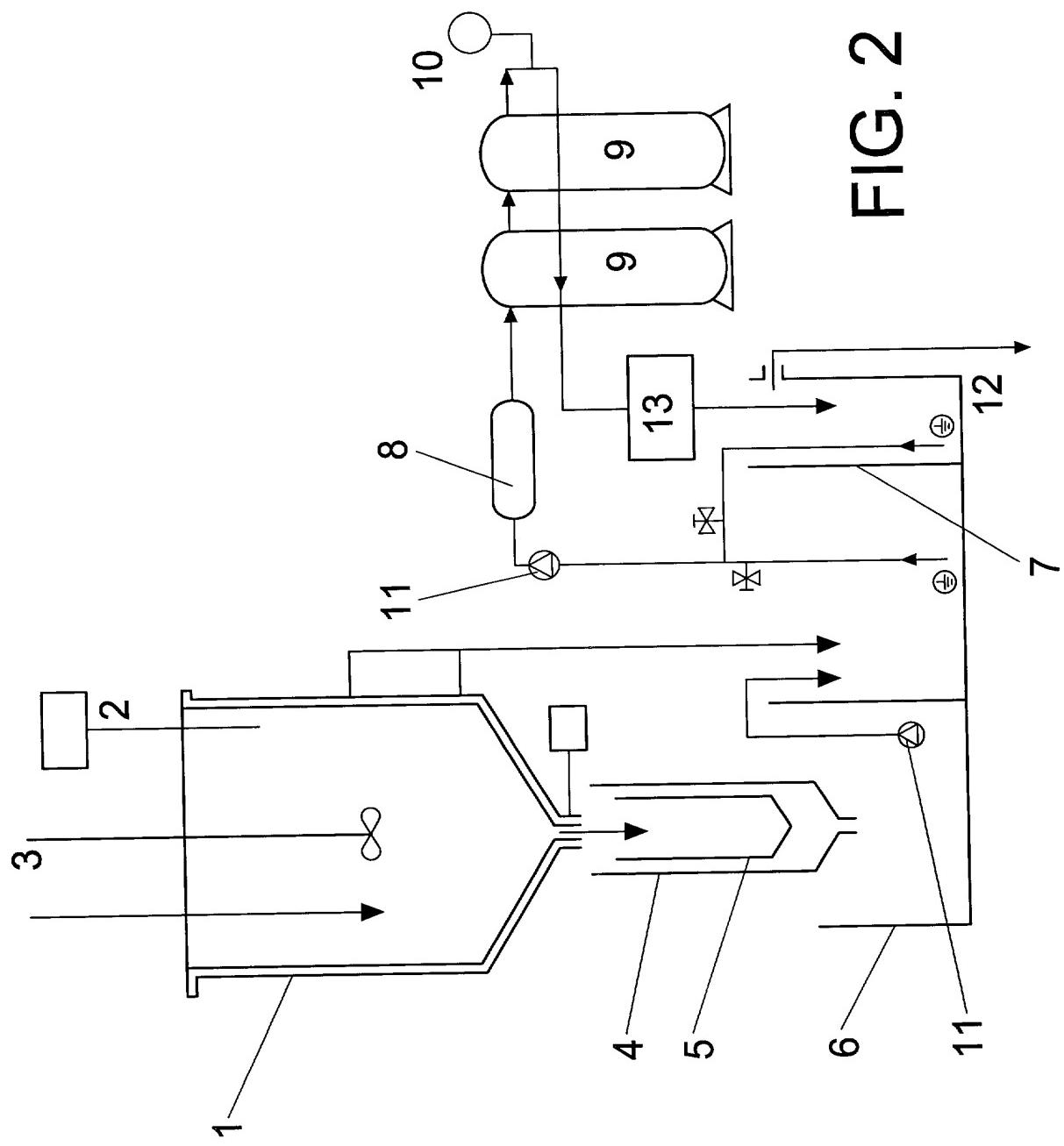
said first active carbon column (9) being connected by an outlet to an inlet of a subsequent active carbon column (9), each further subsequent active carbon column (9) being connected by its inlet to the outlet of the
20 preceding active carbon column (9); and

automatic control means for providing that mixed clarified water is retained in each carbon column (9) for at least two hours.

25 2. A purification equipment according to claim 1, characterised in that the tank-filter (1) is a settling tank with at least two outlets for the clarified water, to which flocculent can be added, the sludge being extracted by gravity through the lower part thereof and
30 sent to a filtering bag (5) where it is retained, while the clarified water is sent to an intermediate tank (7), being joined to this the water which passes through said filtering bag (5) and is received in a collection tank (6).

3. A purification equipment according to claim 2,
characterised in that the filtering bag (5) is arranged
inside a metal frame (4) which acts as a support for it
and as a collector for the water passing through it on
5 its way to the reception tank (6).
4. A purification equipment according to claim 1,
characterised in that the tank-filter (15) is a
polypropylene bag filter that includes diatomaceous
10 earth, with circulation being maintained in closed
circuit from the tank (6) containing water, the bags
being filled with a pre-layer of this earth; a pump (11a)
sucking the liquid to be purified and which passes
through that filter (15) to the reception tank (6), from
15 where it is decanted to the array of columns 9 of
activated carbon.
5. A purification equipment according to any of the
preceding claims, characterised in that at the outlet
20 from the array of columns 9 of activated carbon is
included an ultraviolet lamp (13) for optimising the
purification.
6. A purification equipment for wastewater coming from
fruit and vegetable processing plants and phytosanitary
25 treatments in the field, according to any of the above
claims, characterised in that the array of columns 9 of
activated carbon, three in number, are mounted on a
rotating plate (17) where there exists a fourth bottle
30 (9) in reserve, which replaces number three when the
first one becomes clogged up and is withdrawn and
replaced by the second, with the third taking over in the
second place.





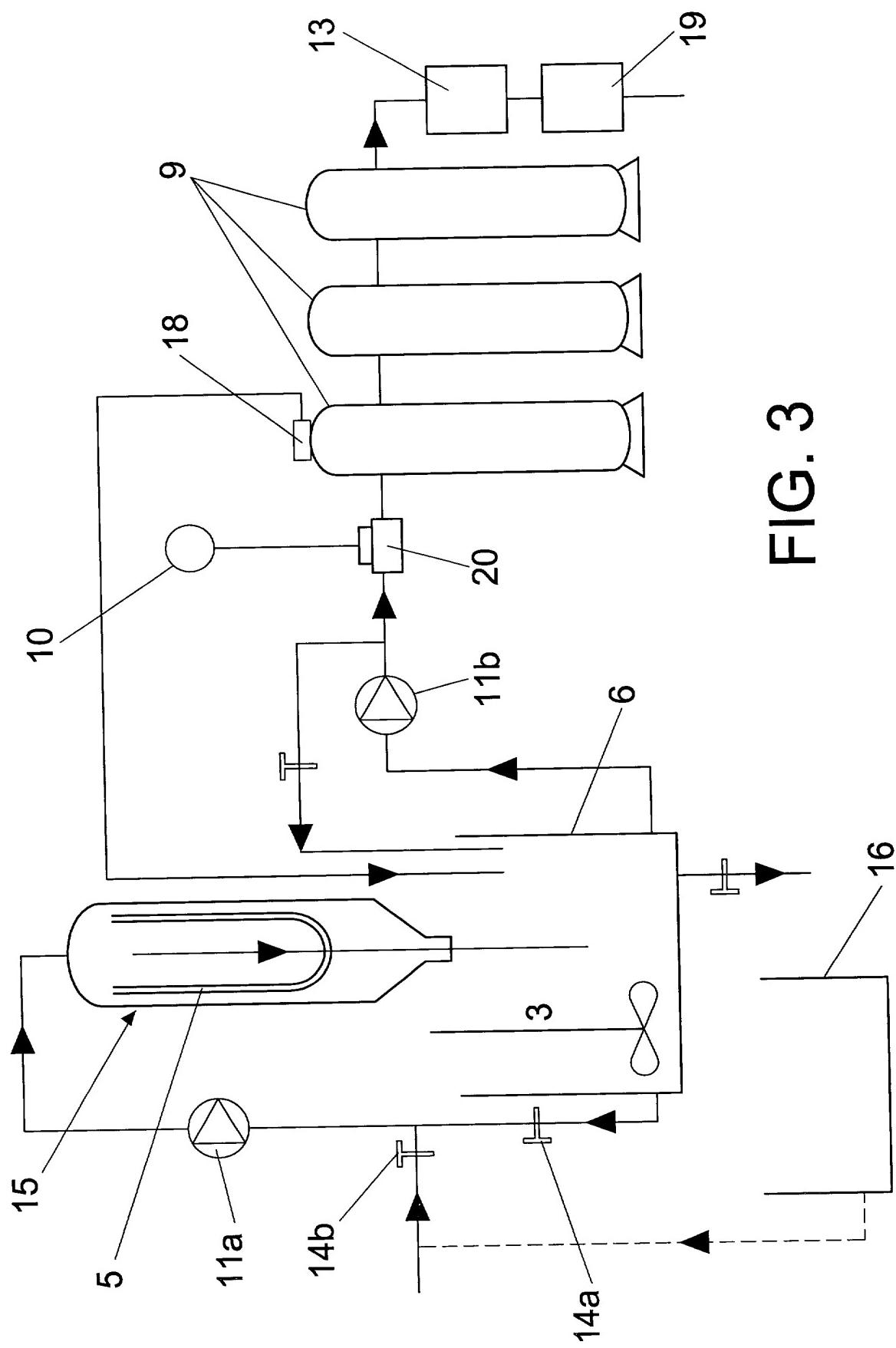


FIG. 3

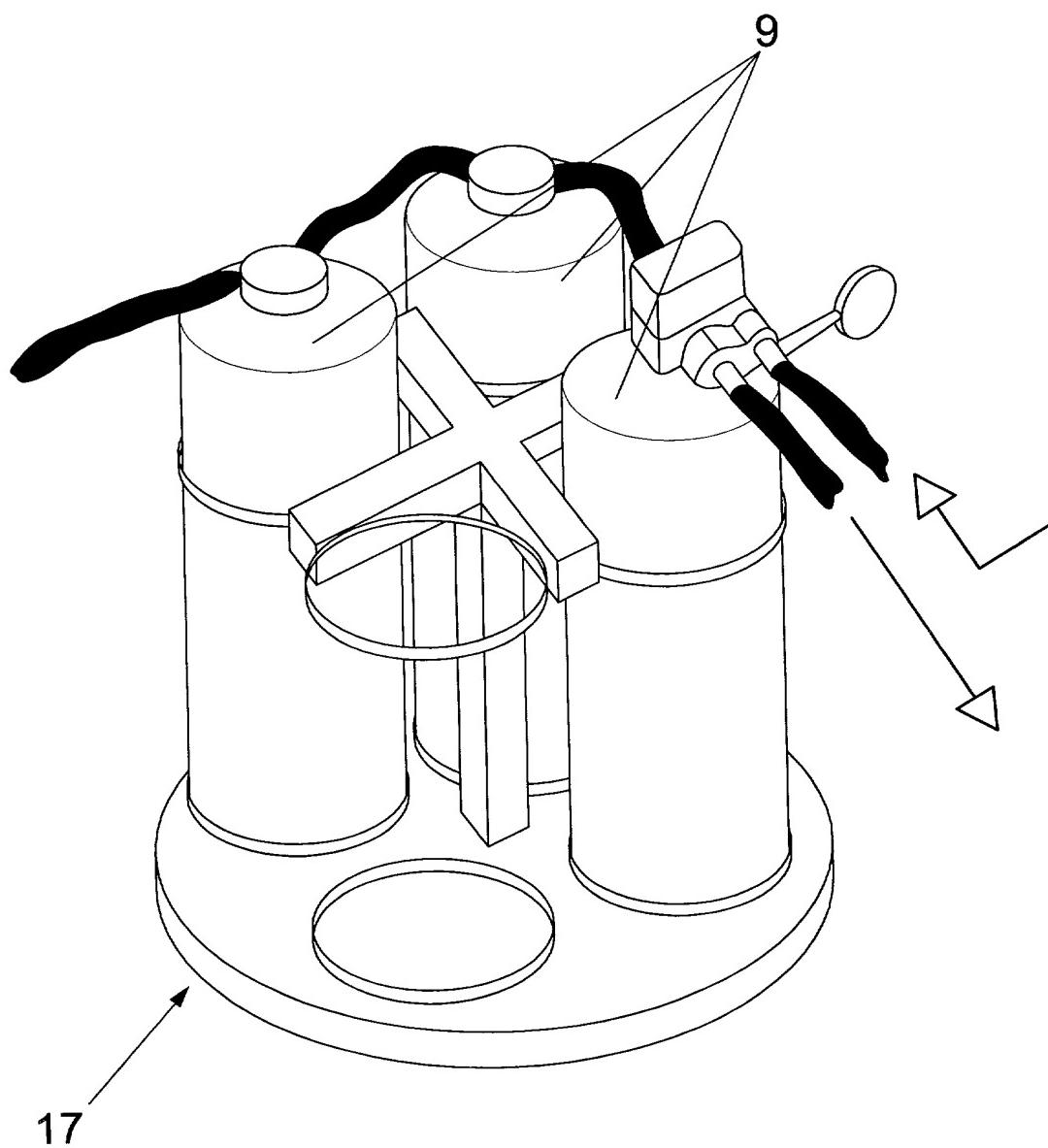


FIG. 4

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below under my name.

I believe that I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

PURIFICATION EQUIPMENT FOR WASTEWATER COMING FROM FRUIT AND VEGETABLE PROCESSING PLANTS AND PHITOSANITARY TREATMENTS IN THE FIELD.

the Specification of which

- is attached hereto
 was filed on 3 FEBRUARY 2000
as International Application No. PCT/ES00/00033

I hereby state that I have reviewed and understand the contents of the above-identified Specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, 1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 (a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or §365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT international application having a filing date before that of the application on which priority is claimed.

<u>APPLICATION NUMBER</u>	<u>PRIOR FOREIGN FILED APPLICATION(S)</u>		
	<u>COUNTRY</u>	<u>(MONTH/DAY/YYYY)</u>	<u>PRIORITY CLAIMED</u>
U9900280	ES	FEBRUARY 3, 1999	YES

I hereby claim the benefit under Title 35, United States Code §119(e) of any United States provisional application(s) listed below.

<u>APPLICATION NUMBER(S)</u>	<u>FILING DATE (MM/DD/YYYY)</u>
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I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s), or §365(c) of any PCT international application designating the United

States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of Title 35, United States Code §112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

<u>U.S. Parent Application No.</u>	<u>PCT Parent Number</u>	<u>Parent Filing (MM/DD/YYYY)</u>	<u>Parent Patent Number (if applicable)</u>
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The undersigned hereby authorizes the U.S. attorney or agent named herein to accept and follow instructions from **UNGRIA PATENTES Y MARCAS, S.A.** as to any action to be taken in the Patent and Trademark Office regarding this application without direct communication between the U.S. attorney or agent and the undersigned. In the event of a change in the persons from whom instructions may be taken, the U.S. attorney or agent named herein will be so notified by the undersigned.

I hereby appoint as my attorneys or agents the registered persons identified under

Customer No. 23565

for the law firm of Klauber & Jackson, said attorneys or agents with full power of substitution and revocation to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

Please address all correspondence regarding this application to **Customer No. 23565**.

DAVID A. JACKSON, ESQ.
KLAUBER & JACKSON
411 HACKENSACK AVENUE
HACKENSACK, NEW JERSEY 07601

Direct all telephone calls to David A. Jackson at (201) 487-5800.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the

United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

FULL NAME OF FIRST INVENTOR: GARCÍA PORTILLO, Manuel 100

COUNTRY OF CITIZENSHIP: SPAIN

FULL RESIDENCE ADDRESS: Sevilla, 45
Polígono Industrial Fuente del Jarro
46988 PATERNA (Valencia)
Spain ESX

FULL POST OFFICE ADDRESS: SAME AS ABOVE

SIGNATURE OF INVENTOR Manuel Garcia Portillo

DATE 19-7-01

FULL NAME OF SECOND JOINT INVENTOR: SALVADOR AVIÑO, Elías 2-2

COUNTRY OF CITIZENSHIP: ES

FULL RESIDENCE ADDRESS: Sevilla, 45
Polígono Industrial Fuente del Jarro
46988 PATERNA (Valencia)
Spain ESX

FULL POST OFFICE ADDRESS: SAME AS ABOVE

SIGNATURE OF INVENTOR Elias Salvador Avino

DATE 19 - 07 - 01

FULL NAME OF THIRD JOINT INVENTOR: OLIVARES VICENTE, Javier *3-a*

COUNTRY OF CITIZENSHIP: ES

FULL RESIDENCE ADDRESS: Sevilla, 45
Polígono Industrial Fuente del Jarro
46988 PATERNA (Valencia)
Spain *ESX*

FULL POST OFFICE ADDRESS: SAME AS ABOVE

SIGNATURE OF INVENTOR *Javier Olivares Vicente*

DATE *19-7-01*

FULL NAME OF FOURTH JOINT INVENTOR: LLAMAS DE ANDRÉS, Rafael *4-a*

COUNTRY OF CITIZENSHIP: ES

FULL RESIDENCE ADDRESS: Valencia, s/n
Parque Tecnológico
Apartado 103
46980 PATERNA (Valencia)
Spain *ESX*

FULL POST OFFICE ADDRESS: SAME AS ABOVE

SIGNATURE OF INVENTOR *Rafael Llamas de Andrés*

DATE *7/02/2001*

FULL NAME OF FOURTH JOINT INVENTOR: SORIANO JIMÉNEZ, María de los Angeles *5w*

COUNTRY OF CITIZENSHIP: ES

FULL RESIDENCE ADDRESS: Valencia, s/n
Parque Tecnológico
Apartado 103
46980 PATERNA (Valencia)
Spain *ESX*

FULL POST OFFICE ADDRESS: SAME AS ABOVE

SIGNATURE OF INVENTOR *x María de los Angeles Soriano Jiménez*

DATE 30/1/01

FULL NAME OF FIFTH JOINT INVENTOR: LORENZO BLANCO, Juan Pablo *6w*

COUNTRY OF CITIZENSHIP: ES

FULL RESIDENCE ADDRESS: Valencia, s/n
Parque Tecnológico
Apartado 103
46980 PATERNA (Valencia)
Spain *ESX*

FULL POST OFFICE ADDRESS: SAME AS ABOVE

SIGNATURE OF INVENTOR *x Juan Pablo Lorenzo Blanco*

DATE 19/07/01